

SCALLOPLEAF SAGE (*SALVIA VASEYI*: LAMIACEAE) DISCOVERED IN ARIZONA

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ABSTRACT

During the course of field work in Cabeza Prieta National Wildlife Refuge, southwestern Arizona, in 2003, James Cain and Brian Jansen collected *Salvia vaseyi*, previously known only from the western edge of the Sonoran Desert in California and Baja California. Our findings indicate this shrub might be more widespread in southwestern Arizona mountains. *Salvia vaseyi* in Arizona seems to represent a relict population. There are other shrubby *Salvia* in Arizona, but *S. vaseyi* is the most xeric-inhabiting species and has the narrowest ecological and geographical range.

RESUMEN

Durante el desarrollo de trabajo de campo en el refugio nacional de fauna Cabeza Prieta, en el suroeste de Arizona en 2003, James Cain y Brian Jansen recolectaron *Salvia vaseyi*, anteriormente conocida sólo de la zona occidental del Desierto de Sonora y montañas adyacentes de California y Baja California. Nuestros hallazgos indican que este arbusto puede estar más extendido en las montañas del suroeste de Arizona. En Arizona, *S. vaseyi* parece representar una población relictica. Hay otras *Salvias* arbustivas en Arizona, pero *S. vaseyi* es la especie más xérica y presenta los intervalos ecológico y geográfico más restringidos.

INTRODUCTION

On 11 February 2003, JWC and BDJ were collecting and measuring vegetation near the crest (ca. 840 m) of the Sierra Pinta (113.56051°W, 32.29510°N, NAD 83) on the Cabeza Prieta National Wildlife Refuge in southwestern Arizona. These efforts were part of a larger study investigating the ecology of desert bighorn sheep (*Ovis canadensis mexicana*). They encountered a highly aromatic shrub that they could not identify and collected a dried inflorescence and portions of the herbage to be identified by botanists at the University of Arizona Herbarium. The plant was identified by RSF as scallopleaf sage, *Salvia vaseyi* (Porter) Parish (*Audibertia vaseyi* Porter), and represented a new record in Arizona. Cain subsequently collected additional specimens, and in 2010 J. Malusa (School of Natural Resources, University of Arizona, pers. comm.) discovered another population in the nearby Copper Mountains in the Goldwater Military Range (see Broyles et al. 2007 for geographic information). This species was previously known from southeastern California and northernmost Baja California on the western edge of the Sonoran Desert in the Peninsular and eastern Transverse Ranges and adjacent mountains (e.g., Consortium of California Herbaria; Hickman 1993. Fig. 2).

Salvia vaseyi is a highly aromatic shrub or subshrub reaching ca. 1+ m tall (Figs. 1 & 3). It is facultatively drought deciduous and experiences severe dieback in drought. The leaves are thick and highly variable in size, depending on soil moisture, densely pubescent with minute, appressed trichomes, conspicuously glaucous, and the surfaces are often rugulose. The inflorescences are verticillate on usually wand-like, tall flowering stems (Figs. 1 & 3). The calyces, 8–14 mm long, have mostly awned lobes, the awns becoming

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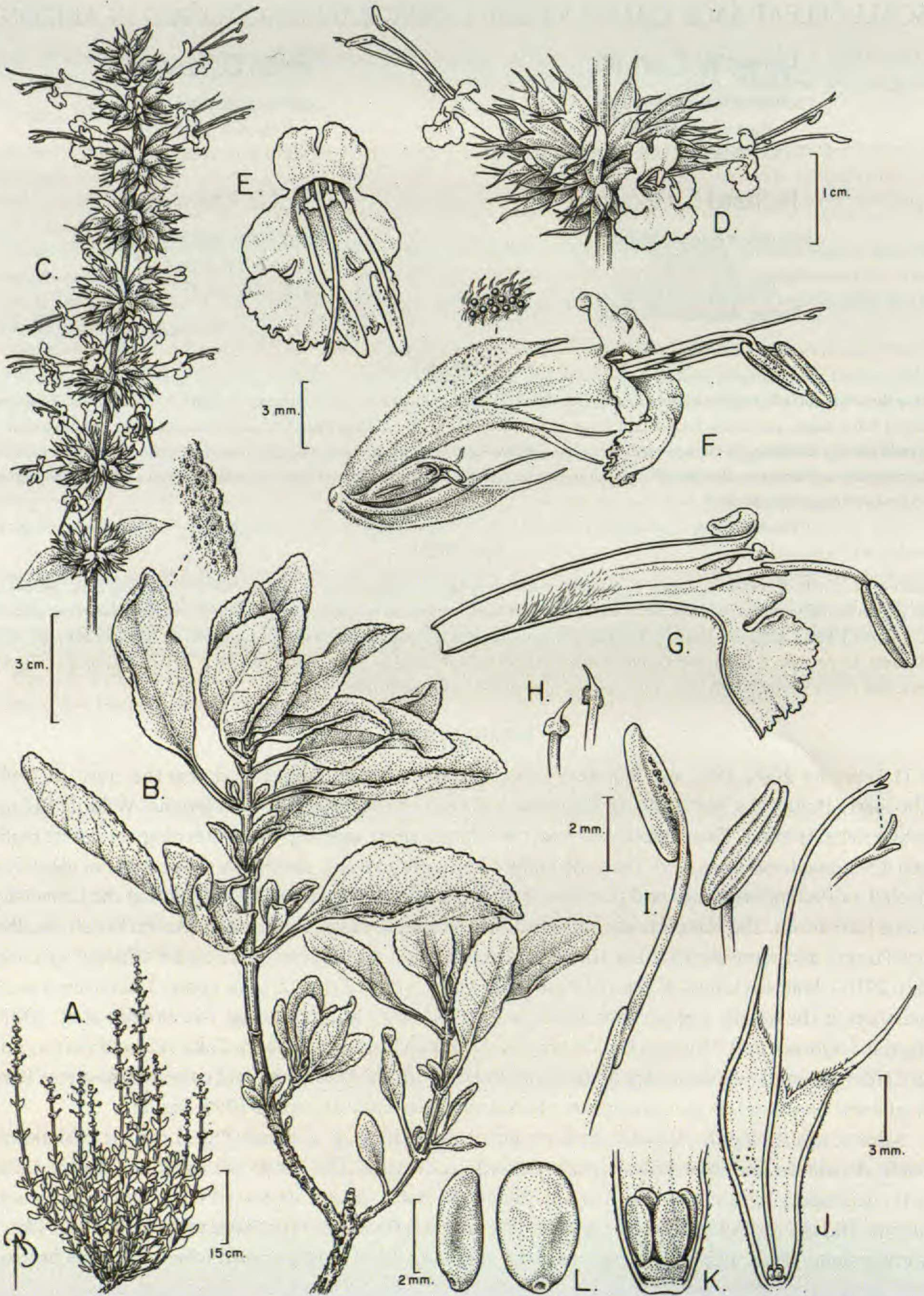


FIG. 1. *Salvia vaseyi*. Cain & Jansen s.n., 11 Feb 2003. Drawing by Bobbi Angel.



FIG. 2. Distribution of *Salvia vaseyi*. California and Baja California localities obtained from the Consortium of California Herbaria (http://ucjeps.berkeley.edu/cgi-bin/get_consort.pl) and the Southwest Environmental Information Network (<http://swbiodiversity.org/seinet/collections/index.php>); Baja California localities based on specimens cited in text and are approximate. Map by JWC.

spinescent when dry after seed maturity. The corollas, filaments, and styles are pure white, and the corolla tube 13–20 mm long (Figs. 1 & 3). Fruits have light brown nutlets 2.5–3 mm long. The Arizona plants are reproductive at least in spring and likely in fall, depending on rains (soil moisture). We found no morphological differences between Arizona and California specimens.

The Arizona *S. vaseyi* populations occur in vegetation communities characteristic of granitic mountains in the Lower Colorado Valley phytogeographic region of the Sonoran Desert (Shreve 1951; Turner & Brown 1994; Felger et al. 2007). Common plants growing in association with *S. vaseyi* include foothill palo verde (*Parkinsonia microphylla*), brittlebush (*Encelia farinosa*), creosotebush (*Larrea divaricata* var. *tridentata*), desert lavender (*Hyptis emoryi*), white bursage (*Ambrosia dumosa*), rough jointfir (*Ephedra aspera*), range ratany (*Krameria grayi*), desert agave (*Agave deserti*), ocotillo (*Fouquieria splendens*), buckhorn cholla (*Cylindropuntia acanthocarpa*), barrel cactus (*Ferocactus cylindraceus*), saguaro (*Carnegiea gigantea*), and elephant tree (*Bursera microphylla*).

The climate in Yuma County, Arizona, is extremely arid. Rainfall is bimodal and varies widely. The Arizona *S. vaseyi* sites are probably nearly frost-free and probably experience 7.6–10.2 cm (2.86–4.18 in) average annual rainfall based on the nearest long-term weather data from Wellton and Yuma (Western Regional Climate Center 2010). Mean rainfall recorded in the Sierra Pinta (2002–2005) was 1.7 cm in summer (April–August) and 4.9 cm in winter (December–March). High temperatures in summer reached $>45^{\circ}\text{C}$, and low temperatures in winter reached 2.6°C (JWC, unpublished data).

Salvia vaseyi in the Sierra Pinta was found in 3 local areas, each approximately 60 m in diameter and on steep granitic slopes with southwest exposures. The plants at the summit, at 838 m (2750 ft; Cain & Jansen 11 Feb 2003), were common but not abundant. The second site, on the lower slope of the mountain at ca. 405 m (1180 ft; Cain & Jansen 15 Nov 2003) and 6 km north of the first locality, had 20–30 *S. vaseyi* plants. The third site, near the base of the mountain (ca. 360 m; Cain & Jansen 21 Feb 2005) and 5 km northwest of the

first site, had less than 12 individual plants. On 8 March 2010, J. Malusa found another Arizona population in the Copper Mountains on a north-facing slope about 120 m below the summit. The plants were reported as common at this site. The Copper Mountains are about 28 km west-northwest of the Sierra Pinta (Fig 2).

During extensive fieldwork over several years, JWC and BDJ did not find other *S. vaseyi* plants in the Sierra Pinta or to the west in the ecologically similar Cabeza Prieta Mountains, and J. Malusa reported that he did not find additional plants in the Copper Mountains or similar nearby mountains. Felger and others have conducted extensive fieldwork in other granitic mountains in southwestern Arizona and also have not found other *S. vaseyi* plants. Yet, due to the remote location of many southwestern Arizona mountains and restricted vehicle access due to wilderness designation, there might be other localities where this or other species, previously undocumented in Arizona, occur. *Salvia vaseyi* in Arizona seems to represent a relict population, most likely from a more extensive Ice Age distribution continuous with the Californian populations. Similar Ice Age relict populations, on either side of the Salton Trough are commonplace (e.g., Van Devender 1990, 2007; Felger & Van Devender 2010).

There are approximately 5 shrubby species of *Salvia* in Arizona: *S. dorrii* (Kellogg) Abrams complex (includes *S. pachyphylla* Epling ex Munz), *S. mohavensis* Greene, *S. parryi* A. Gray, *S. pinguifolia* (Fernald) Wootton & Standley, and *S. vaseyi*. Among these, *S. vaseyi* is the most xeric-inhabiting species and has the narrowest ecological and geographic ranges and can be distinguished by its rugulose leaf blades with crenulate margins and bristle-tipped calyx teeth.

Specimens examined: ARIZONA. Yuma Co.: Cabeza Prieta National Wildlife Refuge, Top of Sierra Pinta, ca. 0.5 mi S of Sunday Pass (113.61053W; 32.31704N), ca. 2750 ft, 12–18 inches tall, locally common among granite boulders with *Agave deserti*, *Ambrosia dumosa*, *Aristida purpurea*, *Cheilanthes parryi*, *Ditaxis lanceolata*, *Ephedra aspera*, *Eriogonum wrightii*, *Gymnosperma glutinosum*, *Heteropogon contortus*, *Hyptis emoryi*, *Krameria erecta*, *Larrea divaricata*, *Lotus rigidus*, *Machaeranthera pinnatifida*, *Mentzelia puberula*, *Nicotiana obtusifolia*, *Nolina bigelovii*, *Parkinsonia microphylla*, *Physalis crassifolia*, *Sphaeralcea ambigua*, *Stephanomeria pauciflora*, *Tridens muticus*, *Trixis californica*, *Bahiopsis parishii*, 11 Feb 2003, Cain & Jansen s.n. (ARIZ); Sierra Pinta, ca. 2.6 mi WNW of Sunday Pass, just S of Isla Pinta, 113.61053W, 32.31704N, 1180 ft, associated species: *Ambrosia dumosa*, *Hyptis emoryi*, *Ephedra aspera*, *Cercidium microphyllum*, *Lotus rigidus*, *Aristida adscensionis*, *Opuntia versicolor*, *Agave deserti*, 15 Nov 2003, Cain & Jansen s.n. (ARIZ); Sierra Pinta, ca. 2.7 mi NNW of Sunday Pass, E of Isla Pinta (113.59921W; 32.33719N, 1,330 ft); associated species: *Ambrosia dumosa*, *Hyptis emoryi*, *Ephedra aspera*, *Cercidium microphyllum*, *Bursera microphylla*, *Ditaxis lanceolata*, *Lotus rigidus*, *Aristida adscensionis*, *Perityle emoryi*, *Opuntia versicolor*, *Agave deserti*, 21 Apr 2005, Cain s.n. (ASC, ARIZ, ASU, B, BRIT, CAS, COLO, DAV, DES, F, GH, K, MO, MEXU, MO, NY, RM, RSA, SD, TEX, UC, UCR, UTC, US, USON, Herbarium at Cabeza Prieta National Wildlife Refuge at Ajo, AZ); Barry M. Goldwater Military Range, ¼ mi E of summit of Copper Mountains. UTM S218 700, 3599 669 (WGS 84), 2480 ft, Sonoran desertscrub with *Ephedra aspera*, *Agave deserti*, *Bahiopsis parishii*, *Eriogonum fasciculata*, *Encelia farinosa*, *Ziziphus obtusifolia*, *Lycium exsertum*, etc, 8 Mar 2010, Malusa s.n. (ARIZ).

Baja California: summit of grade to Colorado Desert on road from Tia Juana to Mexicali, 14 May 1925, Peirson 5882 (RSA!); dry slopes, 38 mi W of Mexicali, 2500 ft, 14 May 1925, Munz 9582 (RSA!); East slope of the Sierra Juarez along Hwy 2, steep slopes with granite boulders and vegetation of *Agave deserti*, *Salvia* spp., *Haplopappus cuneatus*, *Thamnosma montana*, *Eriogonum fasciculatum*, etc, 3000 ft, an uncommon shrub, 25 Apr 1985, Sanders & Neisess 722 (RSA).

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FIG. 3. A–C. *Salvia vaseyi*. Cain s.n., 21 Apr 2005. Sierra Pinta, Cabeza Prieta National Wildlife Refuge, Arizona, 360 m elev. Photos by JWC. D. *Salvia vaseyi*, Malusa s.n., 8 Mar 2010. Copper Mountains, Arizona, 755 m elev. Photo by Jim Malusa.

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